

## **Regional Investigation of Crimes and Socio-Security-Economic Modeling of Database: A Case Study in Qazvin Province**

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### **Abstract**

The whole realm of geographical positioning is based on establishing some principles experimentally examined. This means geographical positioning originates from the information about crimes and criminals. But, there is a problem, illegal activities are not normally seen by public and as soon as crimes get recognized it changes into data. Also, most of the information, especially the places where criminals live, is available only when the criminals get arrested, which means most of the studies may be deviated because the unsolved crimes or not reported to police should be ignored. In general, crime and criminals may bring some information for research in one of the two general methods. The most common case is when the details turn into a part of the police official report, various law firms, or government agencies. These reports are often incomplete and usually not recorded correctly. Therefore, this source of information is likely to deviate from official sources. Fortunately, the limited studies which have compared these two sources of information indicated that they do not contradict each other, so it is necessary to draw a descriptive diagram in this field. Therefore, modeling and drawing database for more efficient use of information have been investigated by using descriptive method in this article. The results reflect the fact that the way to fight and equipment needed, can be organized according to the distribution maps. According to available data bases of previous information of crimes and drawing different diagrams in the map of Qazvin city, crimes dispersion is obtained.

**Key words:** crimes, geographical data, modeling, base and data drawing

### **Introduction**

The whole realm of geographical positioning is based on establishing some principles experimentally examined. This means geographical positioning originates from the information about crimes and criminals. But, there is a problem, illegal activities are not normally seen by public and as soon as crimes get recognized it changes into data. Also, most of the information, especially the places where criminals live, is available only when the criminals get arrested, which means most of the studies may be deviated because the unsolved crimes or not reported to police should be ignored. In general, crime and criminals may bring some information for research in one of the two general methods. The most common case is when the details turn into a part of the police official report, various law firms, or government agencies.

These reports are often incomplete and usually not recorded correctly. Therefore, this source of information is likely to deviate from official sources. Fortunately, the limited studies which have compared these two sources of information indicated that they do not contradict each other, so it is necessary to draw a descriptive diagram in this field. Therefore, modeling and drawing database for more efficient use of information have been investigated by using descriptive method in this article. The results reflect the fact that the way to fight and equipment needed, can be organized according to the distribution maps. According to available data bases of previous information of crimes and drawing different diagrams in the map of Qazvin city, crimes dispersion is obtained. In this paper

division of places happened in Qazvin province and the crimes was divided into a variety of crimes including economic, social, and cultural crimes. So the way to fight against the crimes should be fitted with the kind of crimes and their specific solutions and the way to handle them. Consequently, the concentration and distribution of social, economic, and cultural sites and places are shown.

### **The place characteristics**

The features of place in a GIS database have been stored in the form of vector or raster data.

#### ***Vector data***

GIS data structure changes into a vector format and stores the features of the map in the form of pairs (Y and X) in a place. A point is described by a coordinated pair (X-Y) and its name or tag. And a line is described by a collection of coordinated pairs (X-Y) and their names or tags. So a line is made of the parts of a straight line. A Physical area is called polygon and is shown by a set of coordinated pairs, names, and its label. A vector framework shows the place, shape, features and constrains exactly. The accuracy is limited just by accuracy and scale of map processing, resolution of the input devices and the skill of data operator (Shokuhi, 2001).

#### ***Raster data***

Map features are created such as pixel cells in a grid matrix by network-oriented form. Space is defined in rows or columns by the matrix of points or cells organized. If rows and columns are numbered, using the number of the column or row can determine the location of each component. There are some advantages to the form of (Raster) to store and process certain types of data (GIS). The comparison of the two forms is shown in the following table.

**Table 1: The comparison of the vector and raster data**

	raster data	vector data
Shape Description	Imprecise	precise
Data Capacity	Big	Small
Processing Speed	Fast	Slow
Complicated	Simple	Complicated
Construction Cost	Bottom	Top
Data Updating	Comfortable	Uncomfortable
Data Analysis	Comfortable	Difficult

The relation of object-oriented and geographical database were used in this project. The unified modeling language has been accepted in many object-oriented data modeling activities recently. Object-oriented data modeling (GIS) has been the most important improvement in the technology (GIS) since 10 years ago. Unlike the traditional data models (GIS), which include the links between data tables, graphical tables and stored features in different places, raster and vector data can be stored in object-oriented data modeling (GIS).

#### ***The structural differences of the raster and vector data***

- Raster data has lower place precision in compare to the vector data.
- The size of a map (layers) with the structure of vector data is always less than the size of the map with the structure of raster data.
- Place information in the structure vector data is the coordinates of the terrain, but in the structure of raster data, row and column number are the terrain.

- In the structure of raster data, each cell can only have a numeric value (Value) describing the descriptive information of the terrain, but in the structure vector data, endless descriptive and analytical information can be linked to the each terrain.

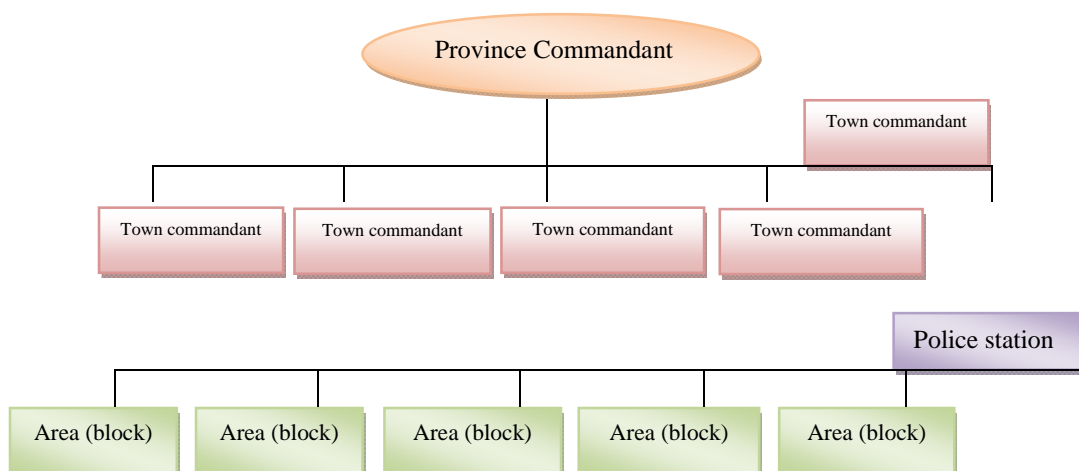
### Object orientation

The real world can be closely drawn by object orientations because of applying the smart objects by some collections. Object-oriented data modeling (GIS) manages the smart objects by precise principals and definite relations in designing database, because the business principals are in the object-oriented data modeling (GIS) itself. The number and complexity of conventional programming routines that need to be written or run in the background are also reduced. An object-oriented data modeling (GIS) can be designed and run by applying computer-aided software engineering tools and unified modeling language. The data model are integrated data not separated from each other in the form of network or anything else and each feature at any time object-oriented can be edited by any actions, because areas and features are not locked during editing and multiple actions can complete updating quickly. Object-oriented data modeling (GIS) can be available within standard relational database of a company. This is good news for the department (IT) in local government which may have problems by maintaining the previous proper operation. Geographical database model supports object orientation of vector data and the data model is a kind of physical data model in (GIS).

The goal of defining the new data modeling is to define the features created in the smartness of data collection (GIS) by giving natural behavior on them and also to provide any relational orderings. In this model, the existence is presented in the form of objects with features, behaviors, and relations and a variety of geographical objects have been supported in the system. These objects include simple objects, features and geographical network, notations features and other specific features. This model lets the user to define relations among objects along with the principals about maintaining referential integrity among objects. The data used in (GIS) have different sources and have been stored in different ways. A (GIS) provide tools and methods to integrate the data in the form of a template so that they can be compared and analyzed. A small part of Qazvin was chosen and relative feature data and place data were collected.

### Police structures in Qazvin

Police structures in Qazvin is shown in the figure below:



**Figure 1: Qazvin police structures**

A specialized staff and decision makers are at all above the commandants which includes a number of town commandants and each town commandant includes several police stations and each police station is responsible for specific jurisdiction divided into some parts in order to provide better management and better response for each part. The required information can be extracted based on the following routines: the data of required features for the study collected from the central part of Qazvin in 2011 based on crime statistics reported in different parts and were recorded by the police.

**Table 2: Census types of Qazvin city police crime in 2010**

Gheyasabad 17	Minoodar 14	Bahonar 13	Bazar 12	Modares 11	Crime type	Crime
108	0	119	70	87	Burglary	Security
0	0	0	0	0	Bank	
2	0	1	1	5	Car plate	
0	0	0	0	0	Motorcycle plate	
1	0	0	0	0	Loads	
0	0	0	1	0	Shop (jeweler)	Economic
39	0	31	29	40	Shop (other)	
41	0	70	52	75	Automobile	
62	0	93	73	92	Motorcycle	
79	0	64	68	132	Inside the automobile	
163	0	212	140	161	Parts and equipment	
7	0	4	16	6	Livestock and poultry	
327	0	128	101	275	Other robberies	Social
11	0	15	32	23	Private places	
1	0	1	6	3	Public places	
10	0	11	11	56	Bag lifting	
3	0	10	21	30	Pick pocket	
19	0	23	30	75	Shoplifting	

### Methodology

According to the nature of the city as a complex social - spatial system, the most appropriate approach in the structure of the research model is the use of the process of combining methods which can be studied through an organized case study. The process of combining methods makes it possible to use quantitative methods with qualitative methods and to avoid discrimination. This method is currently emphasized in the process of urban studies and urban planning.

#### *Data collection tools*

Applying library resources including documents, books, statistics, maps and all related resources;

Using the World Wide Web due to the topic novelty in order to get the latest scientific information in the field of the present study;

Field operation including going to the site, field observation to inform the central part of the city.

**Table 3: Census types of Qazvin city police crime in 2011**

Gheyasabad 17	Minoodar 14	Bahonar 13	Bazar 12	Modares 11	Crime type	Crime
138	25	95	73	84	Burglary	Security
0	0	0	0	0	Bank	
4	0	2	1	6	Car plate	
0	0	1	0	0	Motorcycle plate	
1	0	3	3	0	Loads	
0	0	0	0	0	Shop (jeweler)	Economic
38	2	38	36	42	Shop (other)	
62	20	76	60	92	Automobile	
75	7	105	134	101	Motorcycle	
116	7	65	70	152	Inside the automobile	
104	39	156	154	119	Parts and equipment	
2	1	2	4	4	Livestock and poultry	
238	73	115	135	216	Other robberies	
11	3	4	23	18	Private places	Social
4	0	3	3	1	Public places	
19	1	12	12	60	Bag lifting	
1	0	7	10	19	Pick pocket	
13	1	13	27	56	Shoplifting	

#### ***Drawing a diagram of a database management system (DBMS)***

Before getting excited by exciting prospective that the geographical positioning presents in crime analysis, a few important notices should be emphasized. Many of these warnings resulted from the fact that the whole realm of geographical positioning are based on establishing some principles which have been experimentally examined. This means it is resulted from the information about crime and criminals. But there is a problem, illegal activities are not normally seen by public and as soon as crimes get recognized it changes into data. Also, most of the information, especially the places where criminals live, is available only when the criminals get arrested, which means most

of the studies may be deviated because the unsolved crimes or not reported to police should be ignored.

In general, crime and criminals may bring some information for research in one of the two general methods. The most common case is when the details turn into a part of the police official report, various law firms, or government agencies. According to Allison (2003), although the reports are of great value for research and subsequent operations, but they are not generally provided by the idea of detailed analysis. These reports are often incomplete and usually not recorded correctly. The biggest problem of the reports is that they only record the information related to the crimes officially considered and full details will be provided only for the crime in which the criminals has been identified. Undoubtedly, the behavioral patterns of the criminals arrested in compared with the criminals have not been arrested are different. However, with this probability it is assumed that criminals are arrested through the police focused and systematic processes, not through chasing the criminals, leads to arresting them while they have been committed in frequent crimes. The second sources are the criminals themselves which have been affected by the irregularities of criminals' memory and deviation caused by criminals' justifications of their actions or to exaggerate their criminal activity. Therefore, this source of information is likely to deviate from official sources. Fortunately, the limited studies which have compared these two sources of information indicated that they do not contradict each other, so it is necessary to draw a descriptive diagram in this field (Fringon, 1989; Yongez et al, 2004).

#### ***Database management systems***

P database management systems are essential for the following reasons:

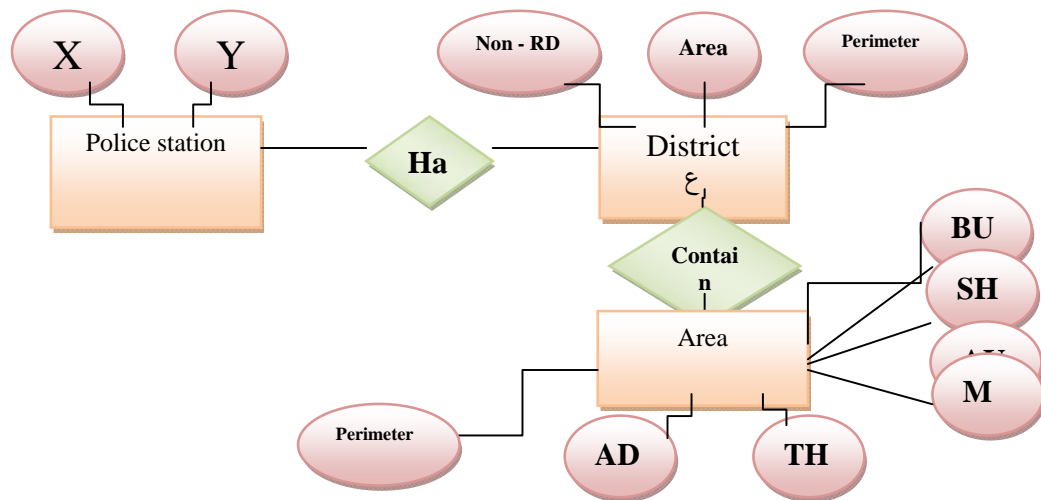
- System Production
- New practical programs should be written based on the newly created needs.
- New permanent files were generated as needed.
- The files may be in a different format in the periods of long time.
- The practical programs can be in different languages.
- There are some problems with direct file processing.
- Data redundancy and inconsistency.
- Multiple users.
- Difficulty in giving stress to data.
- Data isolation.
- Security issues.
- Integration issues.

#### ***Entity relationship diagram (ER)***

Diagrams are used to represent entities and their relationships in the entity relationship models. In these diagrams, the rectangles represent the types of entities and diamonds represent their relationships. Relationships are linked to various constructive entities by some bows and the degree of the entities is given on the bow as shown in the following diagram (Figure 2).

#### ***Descriptions of entities***

- Police station: responsible for the implementation and management of national law.
- Realm: political unit under the jurisdiction of Police Station.
- Block (area): the smallest political unit under jurisdiction of Police Station.



**Figure 2: A simple diagram of entity relationship**

### Company Law

This rule is according to all the barriers among entities made based on them and are as follow:

- Each police station must include a perimeter.
- Each perimeter must include an area.
- Many areas are under the jurisdiction of a police station.

### Structural table

Police stat	Po1_ID*	X	Y
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Boundary	PR_ID*	Area	Perimeter	RD	Non_RD	Po1_IDf
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Block	B_HD*	Area	RD	Non_RD	BU	SH	AU	FR	TH	RO	AD	PL	HO	PR_IDf
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### Data dictionary

Catalog data of the information warehouse is related to the database and could be the best eyes as yellow pages of the database. This catalog includes some data shown in the following table.

**Table 4: Descriptions about different entities and their features**

Abbreviation	Description	Abbreviation	Description
SH	Bag lifting	Po1_ID	Police ID
AU	Car theft	X	Longitude
FU	Shoplifting	Y	Latitude
TH	Theft from vehicle	PR_ID	Realm ID
RO	Robbery	RD	resident population
AD	Private and public places	Non RD	Non-resident population
PI	cars and motorcycles	B_ID	Block ID
HO	Livestock and poultry	BU	Burglary



### Discussion and Conclusion

In this paper, division of places happened in Qazvin province, crimes were divided into a variety of crimes, including economic, and social and cultural crimes. Therefore, the clash and struggle should match the kind of crime and its specific solution. Consequently, the concentration and distribution of social, economic, and cultural sites were shown. Therefore, the way to fight and the equipment available can be organized according to the map distributions. According to available data bases and diagrams of previous crimes in the map of Qazvin city, the crime distribution was obtained. Therefore, the overall prospective was achieved for the planning.

### Strategies and recommendations

- Fair distribution of urban land application (cultural, educational, health and recreational) and the access of different people to the applications;
- Identifying the crime -prone areas and take the necessary measures to fight and prevent them to be created;
- following environmental standards and preventing the construction of suburban farmlands;
- Preventing land and housing speculation and creating conditions to achieve the marginalized to adequate housing ;
- Meeting basic needs such as food, water, shelter, income, safety and work for all of the population of the city;
- Increasing the knowledge and cultural levels of the population of the town, (especially in urban slum areas);
- A system was proposed to reduce crime data on the basis of points.
- Kernel density estimation is proposed. The method is used for producing a continuous mass density of the mass point data. The analyst begins with a point map from the crime time. The especial benefit of this method is that, unlike the consensus region (block), the analysis is not limited to certain geographical areas and spatial pattern can be determined more comfortably (in relation to a point and complex map).
- It would be beautiful to use the animation of changes in crime distribution over time and the relationship of these changes and crime prevention. The Animation and moving pictures can match with crime maps generated by kernel density, because visually there is little time understandable from animation and it readily is understandable.

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